PATENT SPECIFICATION (11) 1 454 214

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(21) Application No. 47575/74 (22) Filed 4 Nov. 1974
(31) Convention Application No. 7 314 956 (32) Filed 5 Nov. 1973 in (33) Sweden (SW)
(44) Complete Specification published 3 Nov. 1976
(51) INT. CL.² F23C 7/00
(52) Index at acceptance F4T A2A1

(19)

(54) AIR DISTRIBUTION MEANS FOR A FURNACE ADAPTED TO BURN WASTE LIQUOR AND ALSO HAVING OIL BURNERS

(71) We, GOTAVERKEN ANGTEKNIK AB, a Swedish Company, of Stjargatan 9, Goteborg, Sweden, do hereby declare the invention for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an improved air supply means for oil burners at chemical recovery burning units.

A waste liquor burning furnace is usually provided, at its lower part, with a number of starting-up oil burners which are used primarily, for heating the cold unit during starting up, but also, together with the waste liquor burners, when an increase of the steam production is required, or occasionally when the fuel bed upon the furnace bottom shows a tendency to "blacken", that is when the combustion intensity is diminished over the hearth, or part thereof.

Hitherto it has proved difficult to arrange the air supply to such starting-up burners in a convenient manner, especially with respect to supplying the required amount of air locally to the burner.

When burning waste liquor, alkali salts are accumulated on the walls of the furnace. When a sufficiently thick deposit has been built up, the surface layer thereof will remain in a liquid state and will flow down along the wall. This layer has a tendency to freeze around the air passage ports and finally to block the same, wholly or partly.

The air passage ports are usually provided with throttling means and experience has shown that it is very difficult to maintain these means in operative conditions, as the movable components thereof often are wedged by frozen chemical residues. The difficulties will increase with increased size of the port and a corresponding increase of the movable component.

A starting-up oil burner is usually formed as a so-called lance, which is introduced into the furnace by way of an air passage port. When the burner is not required it is withdrawn and the port is used for the ordinary supply of air. The reason for this combined arrangement is that it is easier to maintain the air governing means in an operative condition, than would be possible at a passage port used solely when oil burning is needed.

Starting-up oil burners are thus conventionally located in conjunction to air passage ports, the size of which have been dimensioned with respect to the requirements for waste liquor burning.

The size of such a port is ordinarily not sufficient to permit the use of a so-called deflector, that is a device which directs the stream of issued air along the envelope surface of the conically expanding oil mist jet issuing from the burner nozzle. This makes it necessary to maintain a lower pressure in an air box, or part thereof, supplying the "burner passage" than would be desirable with respect to the air requirements of the burner, as there otherwise would be a risk of "blowing-out" the flame.

It will be necessary to supply the remaining part of the air necessary to burn the amount of oil injected by way of adjacent, ordinary air passage ports, which of necessity are located somewhat distant from the burner. This means that this additional air supply will reach the oil mist jet at a distance from the furnace wall, that is there will be a scarcity of air over part of the way of the oil jet from the nozzle to the spot where the jet meets the additional air. This results in an unstable flame in which the point of ignition moves backwards and forwards.

This unstable combustion is a safety risk, especially when starting up boilers having a large sized furnace chamber. Streams of combustion, gas low in oxygen content, may flow down along the still cold walls and extinguish an unstable flame. The burner will continue to inject oil, which is vapourised and is finally explosively ignited, when the burner suddenly starts to function properly, or by way of an adjacent burner.

The object of the present invention is to ensure a satisfactory air supply to a starting-up oil burner, immediately at the beginning of the oil mist jet, whereby a stable combustion is attained and the risk of cold downwardly flowing gases extinguishing the flame is largely reduced.

It has been proposed to improve the cleaning of air passage ports at chemical recovery furnaces by inserting a tubular sleeve member in the air box, the inward end of said sleeve member partly extending into the passage part, the cross section of which increases in the direction away from the furnace. The other end of the sleeve member is sealingly attached to the back wall of the air box, whereby the air is forced to pass through the annular passage formed between the sleeve member and the walls defining the air port. Hereby a comparatively high velocity of the air can be maintained along the circumference of the port, whereby a blasting effect is obtained which has proven efficient in delaying the clogging of the port.

According to the present invention there is provided air distribution means in a furnace adapted to burn waste liquor and also having means for the reception of at least one temporarily applicable oil burner, said distribution means comprising an air supply box located outside one side wall of the furnace and communicating with one or more air passage port or ports in said wall, said port or at least one of said ports being provided with a sleeve member extending from a back wall of the air box through said air box and partly into the air port so that an annular air passage is formed between the sleeve member and the air port, at least one air entrance opening in said sleeve member and means for governing the air passage area of said opening, a tube being mounted within said sleeve member, the tube extending from the back wall of the air box without communication therewith substantially to the mouth of the sleeve member within the port, said tube having an end portion extending outside the said back wall of the air box and being formed for alternate connection of an oil burner head or a closure member, respectively.

The invention will now be described by way of example with reference to the accompanying drawings in which:—

Figure 1 is a perspective view, as seen from inside the furnace, of a portion of the furnace wall including an air passage port having a starting-up oil burning fitted therein, and

Figure 2 shows a horizontal section, through the arrangement shown in Figure 1.

The side walls of the furnace are built up of water-cooled tubes 10, which are welded together by means of fin members 11 to form a gastight membrane structure. The walls are outwardly covered with heat insulating material, which is not shown in the drawing.

A number of air passage ports are located in the walls. A group of such walls are arranged in a horizontal row and communicate with an air box 12 provided outside the wall. Within this box there is a sleeve member 13 at each passage port, extending from the back wall of the box, through the same and partly into the passage port. Depending upon the size of the furnace, the air box may be subdivided into sections, within each of which the volume of air passing therethrough may be governed independently of the conditions in the adjacent sections.

The passage port is defined by a member 14, the walls of which turned towards the box are smoothly rounded and formed to provide a cross section which increases in size in the direction away from the furnace. The sleeve member 13 protrudes into the member 14 of the passage port to form an annular clearance 15 through which, in use, a certain volume of air continuously flows out into the furnace. This volume is selected so as to provide an efficient blasting of the passage port with respect to particles carried by the combustion gases, and chemicals flowing down along the wall respectively.

The sleeve member 13 is provided with two openings 16, through which air, the amount of which will be determined by throttle members 17, may flow into the furnace by way of the sleeve member 13. This is sealingly fitted to the back wall of the air box 12, and is at this back wall provided with inspection and clearing openings 18, 19, respectively, and also for the attachment of means for remote control, for example, a photo cell.

The arrangement described above has been proposed for air passage ports and the novel feature is the provision of means making it possible easily to fit a starting-up oil burner at a passage port.

Depending upon the estimated need for support firing, one or more such ports belonging to the same air box may be fit-

ted out in the manner to be described below.

A tube 20 for housing an oil burner extends centrally through the sleeve member 13, passing through the back wall of the air box and reaching substantially to the end of the sleeve member protruding into the passage port. The end portion of tube 20 is formed as a funnel like member 21 serving as a deflector for the air flowing through the sleeve member and directing this air so that, in use, it will follow the conical shape of the oil mist jet issued by the burner. The funnel like member 21 is provided with openings 22, so that part of the air is permitted to pass axially into the oil mist jet. These openings are preferably formed in a manner to promote a rotating movement.

An oil burner head 23 is mounted within the tube, with its nozzle 24 located within the funnel like member 21.

Conduits 25 and 26, respectively, are connected to the end of the burner head extending outside the back end of tube 20, for the supply of oil and for an atomizing fluid respectively. The burner head 23 is further provided with means, denoted by 27, for adjusting the amount of oil and atomizing fluid entering the burner head respectively and is attached to tube 20 by means of a sleeve nut 28.

When no support firing is needed, the burner head 23 is withdrawn from the tube in order to prevent coking at its nozzle, the back end of tube 20 being closed by a full-walled sleeve nut. It is evident that this arrangement will make possible an easy mounting and dismounting, respectively, of the burner head, so support firing may be rapidly provided as required.

The openings 16 in the sleeve member are of a size to permit the passage of primary air to the burner nozzle, and together with the air flowing out through the annular passage 15, a satisfactory volume of air will be provided immediately at the flame, so no unstable combustion, or an extinction of the flame by cold downwardly flowing gases, as above mentioned, may be expected.

The funnel-like deflector 21 prevents the large amount of air permitted to pass through the sleeve member 13, during support firing, from extinguishing the flame. When the furnace is fired by waste liquor only, the throttle members 17 are usually completely closed, so that the air is made to pass through the passage 15, whereby the blasting effect is best utilized. A similar arrangement may of course be used with waste liquor burning furnaces provided with oil burners for a more or less continuous support firing, and where there is an apparent risk of the passage port being clogged by matter flowing down along the wall. The passage ports for such permanent burners are usually covered by a stamped-on refractory compound, which is easily damaged if the forcing matter is removed by mechanical means. The fixed passage port member 14 will not suffer damages in the same way as the stamped-on compound and the forceful blasting will also here provide an efficient cleaning. The deflector will form an insignificant resistance, when the passage acts as a conventional air supply port.

In order to make adjustment possible, or to temporarily increase the size of the clearance 15, during support firing, the sleeve member 13, or its mouth portion at the passage port, may be arranged to be axially displaceable with respect to the member 14.

WHAT WE CLAIM IS:—

1. Air distribution means in a furnace adapted to burn waste liquor and also having means for the reception of at least one temporarily applicable oil burner, said distribution means comprising an air supply box located outside one side wall of the furnace and communicating with one or more air passage port or ports in said wall, said port or at least one of said ports being provided with a sleeve member extending from a back wall of the air box through said air box and partly into the air port so that an annular air passage is formed between the sleeve member and the air port, at least one air entrance opening in said sleeve member and means for governing the air passage area of said opening, a tube being mounted within said sleeve member, the tube extending from the back wall of the air box without communication therewith, substantially to the mouth of the sleeve member within the port, said tube having an end portion extending outside the said back wall of the air box and being formed for alternative connection of an oil burner head or a closure member, respectively.

2. Air distribution means as claimed in claim 1, wherein the end of the tube remote from the back wall is formed as a funnel shaped deflector, the burner head, with its nozzle, when mounted in the tube, being sufficiently long to reach into the deflector.

3. Air distribution means as claimed in any one of the preceding claims, wherein the sleeve member, or at least the portion thereof extending into the port, is axially displaceable in order to make possible an adjustment of the annular air passage and

thus the amount of air passing therethrough.

4. Air distribution means substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

MARKS & CLERK

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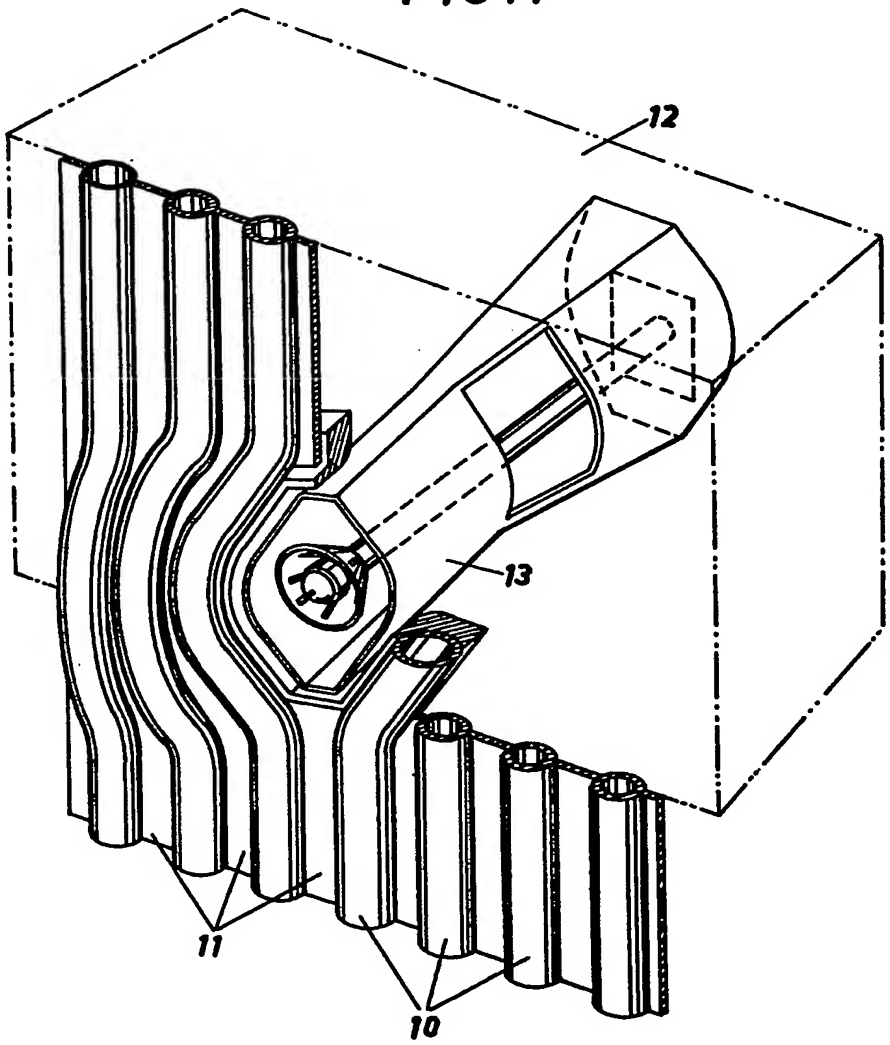
Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1976.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1 454 214 COMPLETE SPECIFICATION
2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEET 1

FIG. 1



1 454 214 COMPLETE SPECIFICATION
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SHEET 2

FIG. 2